

## Technical Modifications and Industry Feedback on Group 2 Codes

Provided by Building Industry Association of Washington members

### 21-GP2-065: HEAT PUMP SPACE HEATING AND 21-GP2-066: HEAT PUMP WATER HEATING

Recommended Technical Modifications: Not applicable, do not pass as-is.

#### Industry Feedback

- 84% of builders report the upfront cost of heat pumps is the biggest hurdle in building affordable entry-level houses.
- Requiring new homes to have heat pumps for space heating limits energy choice for homeowners and increases the cost of buying a new home. Eastern Washington will need supplemental heat sources during cold periods; this adds more upfront costs for Eastern Washington homebuyers.
- Heat pump systems are severely backlogged due to supply chain disruptions and increased demand due to the 2018 iteration of the energy code.
  - This will get worse in 2023 and beyond as the supply chain continues to struggle with meeting increased demand (California is now mandating heat pumps) and changes with the refrigerant standards.
- There is a disconnect between the building code and the planning/zoning codes' setback requirements. The outside compressor location is a challenge with single-family construction. Setback requirements and laws concerning decibel levels at the property line restrict the available locations for the unit. This is not an issue with a gas-fired furnace because they do not have an outside component.
- 60% of builders state that consumers do not like their heat pumps. Consumer complaints noted by members: Prone to improper installation, increasing service calls, and maintenance costs for homeowners. Mechanical issues are prominent and expensive to repair. Compressor failure is prominent and costs an average of \$2,200.
- Heat recovery time for heat pump water heaters lags behind tankless water heaters. This isn't suitable for larger families. If homeowners are set on "hybrid" mode, allowing electric resistance heating elements to operate instead, efficiency will be reduced. This defeats the purpose of this code change.
- Plumbers are not accustomed to working with electricity, and this lack of experience may make them hesitant to suggest HPWHs.
- L&I Electrical Code does not allow HVAC Specialty Electricians to connect indoor and outdoor units of ductless mini-split systems (despite all other states, including California, allowing specialty electricians to do this work). This means more delays and additional costs to the homeowner, builder, and HVAC technician to wait for a journey-level electrician – many of whom do not receive specific training on these connections – to do the work. The wall is left open until the connection is completed.
- Consumers complain about noise if it's placed in conditioned spaces. Another proposal requires water heaters to be installed in the building's thermal envelope (which does not include a garage) so these systems will be placed within the home. Venting the cold air emitted from the heat pump water heater will need to be explored or homeowners will be paying to heat their water heaters.

**Cost to Consumer:** \$8,347 (more than the common gas furnace and electric water heater combination) or to meet credits at the lowest cost possible = \$23,000 added to a new home.

**True Cost to Buyer (over 30-year mortgage):** \$25,041

**Number of Families Priced-Out:** 18,363\*

## 21-GP2-073: R406 TABLE - OPTION 1: HEAT PUMPS NOT REQUIRED VS. OPTION 2: HEAT PUMPS REQUIRED

### Recommended Technical Modifications:

- Options 5.1 and 5.2 need to be vetted by the Plumbing TAG before being considered for adoption. These proposals have not been reviewed by this TAG for their expertise and input.
- Crosswalk schedule for current HSPF and SEER vs. new HSPF2 and SEER2 (to be released in 2023).
- Include definition for primary living space (currently no definition in the code)
- Provide an appendix for jurisdictions to utilize a modification plan if a credit can't be achieved as pre-selected at time of the permit application.
- Require 4 ACH instead of 3 ACH and give credit for meeting 3 ACH in the R406 table.
- Update dwelling sizes to alleviate the large gap between 1,500 – 4,999 square footage homes. There are vastly different energy uses for homes in the current medium dwelling category. BIAW recommends the SBCC create two medium dwelling sizes. The dwelling size and corresponding credit requirements would then be illustrated similar to the below:
  - Dwellings less than 1,500 sq. ft. = 5 credits
  - Dwellings between 1,500 - 3,000 sq. ft. = 6 credits**
  - Dwellings between 3,001 - 4,999 sq. ft. = 8 credits
  - Dwellings 5,000+ sq. ft. = 9 credits
  - Additions between 150-500 sq. ft. = 2 credits

### Industry Feedback: **Option 1 preferred**

- Feedback on both options provided by the SBCC:
  - Option 1 – Not requiring heat pump installation in new homes presents the lowest cost to homeowners, only adding \$15,234 to the cost of building a home. Further, Option 1 preserves energy choice and material flexibility that's important while supply chains recover from the fallout of the pandemic and the HVAC industry adapts to the new refrigeration standards.
  - Option 2 – We do not recommend this option as it presents space heating source credits that penalize homes built with secondary heating systems, common in colder climates such as Eastern Washington. This option also presents a de facto ban on natural gas, eliminating energy choice for Washington homeowners.
  - If energy reductions are the same under both options, perhaps allowing the industry to choose which path they prefer could be a great way to address concerns of all stakeholders until the next code cycle. This approach could be a benefit to those that like the flexibility of option 1 but also those that like the simplicity of option 2.
- Feedback on Specific Credit Requirements:
  - 1.4, 1.5, and 1.6 in Option 1 and 1.2, 1.3, 1.4 in Option 2 won't be utilized by homebuilders, as it requires builders to pay double labor to install continuous insulation – not cost-effective for the credits received.
  - 2.1, 2.2, 2.3 ACH credits require costly, bold measures to achieve. Requires use of Aerobarrier or EcoSeal. If HRV is required, builders (even our high-performance builders) likely won't use. The requirement for an HRV doesn't make sense in the instance where a builder chooses a ductless mini-split, as these systems already complete the same process of recycling energy. These credits likely won't be utilized by builders if they can avoid needing these credits.
  - 3.1 in Option 2 doesn't make sense if heat pumps are mandatory.
  - 3.6 in Option 1 and 3.7 in Option 2's exception don't make sense because all ductless mini-split systems are 10 HSPF or above.
  - 4.2 is well-liked by builders. We would like to see this re-added to the credit table in Option 2.

- 5.1 will only work in two-story homes based on the functionality and installation of typical drain water heat recovery units. This option is not worth the complexity and added cost to the home for the credit received.
- 5.2 likely will not be used by builders and doesn't create a pointer to the UPC.
- 5.6 presents a costly option for credit and is not widely available. Members reference knowledge of one company in Europe that supplies these systems.
- 6.1 solar credits will be costly to receive since the cost of solar has tripled in the last two years due to supply chain constraints.
- 7.1 would be utilized more often if the ventless dryers were removed.

**Cost:** The lowest cost option adds \$23,000 to the cost of building a new home.

**True Cost to Buyer (over 30-year mortgage):** \$69,000

**Number of Families Priced-Out:** 50,600\*

### 21-GP2-079: U-FACTOR REPLACEMENTS

**Recommended Technical Modifications:** Not applicable, do not pass as-is.

#### Industry Feedback

- Removes an option from R406 for energy efficiency credit and requires all windows to adhere to a U-factor of 0.28. This further reduces the number of compliant windows available for builders to install in new homes.
- Windows are already extremely efficient. National Fenestration Rating Council recommends windows be 0.30 for prescriptive compliance.

**Cost:** \$2,593 (difference between 0.30 and 0.28 windows)

**True Cost to Buyer (over 30-year mortgage):** \$7,779

**Number of Families Priced-Out:** 5,704\*

### 21-GP2-089: ALLOWED LEAKAGE RATES

**Recommended Technical Modifications:** Compromise to 4 ACH and add 3 ACH to R406 options table for credit.

#### Industry Feedback:

- Builders are already having a difficult time meeting the 5 ACH standard for compliance while watching costs. The primary barrier is finding qualified subcontractors. We don't recommend moving to a 3 ACH standard.
- Requiring 3 ACH will result in higher costs for home buyers since achieving the air changes per hour will require more sophisticated and costly ventilation and air sealing systems.
- For example, air sealing systems (Aerobarrier specifically) cost an average of \$6,600 for a 2,000 sq. ft. home.
- Harvard School of Public Health recommends a target of 3-4 ACH.

**Cost:** \$6,600

**True Cost to Buyer (over 30-year mortgage):** \$19,800

**Number of Families Priced-Out:** 14,520\*

### 21-GP2-058, 21-GP2-059, 21-GP2-060 – WILDLAND URBAN INTERFACE CODE

**Recommended Technical Modifications:** Not applicable, do not pass as-is.

#### Industry Feedback:

- No legislative mandate for these code amendments. ESSB 6109 only directed the SBCC to adopt specific portions of the 2018 WUI code.



- Process of adopting proposed code amendments was extremely rushed and lacked adequate representation of all interested stakeholders.
- WUI code changes have real impacts on constructing homes affordably.
- DNR mapping lacks parcel-level detail which is key for implementing provisions of the code. The mapping methodology is flawed; areas with the most wildfire risk are not required to comply with the WUI code.
- Provides the Building Official sole authority over modification of DNR's WUI mapping. This could create inconsistent implementation statewide.

**COST:** \$31,212 (single-story) and \$41,352 (2-story)

**True Cost to Buyer (over 30-year mortgage):** \$93,636 (single-story) and \$124,056 (2-story)

**Number of Families Priced-Out:** 68,666\*

### 21-GP2-032: SEALED AIR HANDLER

**Recommended Technical Modifications:** Allow for placement in semi-conditioned spaces (such as a garage)

#### Industry Feedback

- Does not allow for the air handler to be placed in a semi-conditioned space (like a garage).
- If the house does not have a garage, the air handler would then need to be placed in a utility-type closet in the home's conditioned space (not in an attic or crawlspace).
  - Limits usable square footage for home buyers since these rooms need to be 2-3 feet (9 square feet) of clearance for proper airflow.
- Amount of energy efficiency gains realized is not worth the time, cost, or hassle of this code change.

### 21-GP2-080: WATER HEATER INSTALL LOCATION

**Recommended Technical Modifications:** Allow for placement in semi-conditioned spaces (such as a garage)

#### Industry Feedback

- Tank manufacturers are already increasing insulation levels to reduce standby energy losses if placed in semi-conditioned spaces like an attic or garage.
- This is a design standard that will add cost and reduce the flexibility of builders to design a home to consumers' preferences.
- Reduces usable square footage in homes, often closet space, and can reduce a home's value.
- Consumers complain that noise from heat pump water heater is an issue if it's placed within habitable spaces.
- Amount of energy efficiency gains realized is not worth the time, cost, or hassle of this code change.

### 21-GP2-062 AND 21-GP2-063: INCREASED RANGE HOOD VENTILATION

**Recommended Technical Modifications:** Recommend 160 cfm across all range hoods, not dependent on fuel type of range.

#### Industry Feedback

- Availability of range hoods with this cfm is of concern amongst our current supply chain issues.
- Setting an arbitrary level of ventilation without regard to the size of the range hood can decrease indoor air quality if the range being installed is large.



- Range hoods should be properly sized with the BTU rating of the range in question and considerations placed on frequency and type of food that is being cooked.
- [Home Ventilating Institute](#) recommends 100 cfm as a minimum and following the manufacturer's advice on ventilation requirements.
- Requirement for increased ventilation with range hoods doesn't mean indoor air quality will be improved since it's dependent upon the individual cooking to turn it on.

**Cost:** \$425

**True Cost to Buyer (over 30-year mortgage):** \$1,275

**Number of Families Priced-Out:** 935\*

## 21-GP2-091: ELECTRIC VEHICLE SUPPLY EQUIPMENT

**Recommended Technical Modifications:** Not applicable, do not pass as-is.

### Industry Feedback

- 47% of new homes are already being built with EV charging capabilities. The only exceptions are instances where the electrical infrastructure cannot support increased loads and must be upgraded (cost estimates are upwards of \$11,000 per home in a subdivision).
- SBCC lacks the authority to pass this code. There is no legislative mandate to adopt an EV charging requirement in the Residential Code. E2SHB 1287 passed with a mandate for the council to adopt rules related to R-3 occupancies (which only exist in the International Building Code). The Residential Code does not recognize R-3 occupancy classifications.
- A code of this nature belongs in the Electrical Code (managed by Labor & Industries and not the State Building Code Council).
- Enforcement of this code, should it be adopted, would be impossible for most jurisdictions that do not have an electrical building official and/or inspector on staff and there is no pointer in the electrical code that helps electrical inspectors know what the requirements are within the IRC.

**Cost:** \$640

**True Cost to Buyer (over 30-year mortgage):** \$1,920

**Number of Families Priced-Out:** 1,408

## Sources

R406 Table Options	Source(s)
Building Envelope Table	<ol style="list-style-type: none"> <li><a href="https://sbcc.wa.gov/sites/default/files/2022-04/073_WSEC_R_R406.3_R406_Chapter6_Odum.pdf">https://sbcc.wa.gov/sites/default/files/2022-04/073_WSEC_R_R406.3_R406_Chapter6_Odum.pdf</a></li> <li>BNI Building News. 2022. Home Builder’s Cost Book. BNI Publications, Inc.</li> <li>BIAW member survey* and bids for accuracy of source #1.</li> </ol>
Air Leakage and Ventilation Table	<ol style="list-style-type: none"> <li><a href="https://sbcc.wa.gov/sites/default/files/2022-04/073_WSEC_R_R406.3_R406_Chapter6_Odum.pdf">https://sbcc.wa.gov/sites/default/files/2022-04/073_WSEC_R_R406.3_R406_Chapter6_Odum.pdf</a></li> <li><a href="https://zeroenergyproject.org/2018/07/16/is-aerobarrier-the-future-of-air-sealing/">https://zeroenergyproject.org/2018/07/16/is-aerobarrier-the-future-of-air-sealing/</a></li> <li>BIAW member survey* and bids for accuracy of source #1.</li> </ol>
HVAC Equipment Table	<ol style="list-style-type: none"> <li>Equalized values from building industry bids*</li> <li>BNI Building News. 2022. Home Builder’s Cost Book. BNI Publications, Inc.</li> </ol>
Smart Thermostat	<ol style="list-style-type: none"> <li><a href="https://www.energystar.gov/productfinder/product/certified-connected-thermostats/results">https://www.energystar.gov/productfinder/product/certified-connected-thermostats/results</a></li> </ol>
HVAC Distribution Table	<ol style="list-style-type: none"> <li><a href="https://sbcc.wa.gov/sites/default/files/2022-04/073_WSEC_R_R406.3_R406_Chapter6_Odum.pdf">https://sbcc.wa.gov/sites/default/files/2022-04/073_WSEC_R_R406.3_R406_Chapter6_Odum.pdf</a></li> <li>BIAW member survey* and bids for accuracy of source #1.</li> </ol>
Water Heating Table	<ol style="list-style-type: none"> <li><a href="https://sbcc.wa.gov/sites/default/files/2022-04/073_WSEC_R_R406.3_R406_Chapter6_Odum.pdf">https://sbcc.wa.gov/sites/default/files/2022-04/073_WSEC_R_R406.3_R406_Chapter6_Odum.pdf</a></li> <li>BIAW member survey* and bids for accuracy of source #1.</li> </ol>
Renewable Energy Table: Based on Solar PV	<ol style="list-style-type: none"> <li><a href="https://sbcc.wa.gov/sites/default/files/2022-04/073_WSEC_R_R406.3_R406_Chapter6_Odum.pdf">https://sbcc.wa.gov/sites/default/files/2022-04/073_WSEC_R_R406.3_R406_Chapter6_Odum.pdf</a></li> <li>BIAW member survey* and bids for accuracy of source #1.</li> </ol>
Appliance Package Table	<ol style="list-style-type: none"> <li><a href="https://sbcc.wa.gov/sites/default/files/2022-04/073_WSEC_R_R406.3_R406_Chapter6_Odum.pdf">https://sbcc.wa.gov/sites/default/files/2022-04/073_WSEC_R_R406.3_R406_Chapter6_Odum.pdf</a></li> </ol>
Windows (U = 0.30 to 0.28)	<ol style="list-style-type: none"> <li>BIAW member survey* and bids</li> </ol>
EV Charging: Indoor load center, 1 phase 240v main lug only, 150a - 16 spaces	<ol style="list-style-type: none"> <li>BNI Building News. 2022. Home Builder’s Cost Book. BNI Publications, Inc.</li> </ol>
Hood range ventilation requirements (160 cfm for electric ranges and 250 cfm for gas ranges / current requirement is 100 cfm for both)	<ol style="list-style-type: none"> <li>BNI Building News. 2022. Home Builder’s Cost Book. BNI Publications, Inc.</li> </ol>

\*BIAW’s member survey and industry bids will not be released to adhere with anti-trust laws. For more information, please view <https://www.ftc.gov/advice-guidance/competition-guidance/guide-antitrust-laws/dealings-competitors/price-fixing> for more information. National data on whole-home electrification is [available here](#).

[\\*Washington’s Housing Attainability Crisis \(Priced Out\) report](#)

[WUI cost study](#): Used Denver as comparison since the location factor on pricing is similar to Washington’s of 1.04. Also removed costs associated with sprinkler systems since they’re not required in the proposal and/or required statewide. Please note an automatic sprinkler system in Washington is estimated to cost \$6,743 per house